UNITED STATES PATENT AND TRADEMARK OFFICE

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Application Number: 09/425,234
Filing Date: October 25, 1999
Appellant(s): RABIE ET AL.

MAILED

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GROUP 1700

Scott Pundsack
<u>For Appellant</u>

EXAMINER'S ANSWER

This is in response to the appeal brief filed March 03, 2006 appealing from the Office

action mailed 10/5/05.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

Appeals are pending on related cases 09/916,246 and 10/461,687

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,403,479   SMITH et al   04-1995

Patent Application Number 11/106,681 (for double-patenting)

Lennetch Bubble Point, printed from the internet on 3/20/06;

<< http://www.lenntech.com/bubble-point.htm >>

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 5-17 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-23 of copending Application No. 11/106,681. Although the conflicting claims are not identical, they are not patentably distinct from each other because all the claims recite methods of cleaning a membrane using cleaning chemicals with obvious variations in cleaning agent concentrations and/or the number of cleaning cycles. Any details of the system

recited are also obvious because the two applications have the same or similar system

having immersed membranes and are for treating water containing solids.

This is a provisional obviousness-type double patenting rejection because the

conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly
claiming the subject matter which the applicant regards as his invention.

Claim 6-10 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

Claim 6 recites the limitation "more intensive first cleaning" . There is insufficient

antecedent basis for this limitation in the claim. For examination purpose, any

additional cleaning step is assumed as the more intensive first cleaning.

Claim Rejections - 35 USC § 102

1. <u>Claims 5-10 and 13-17 are rejected under 35 U.S.C. 102(b) as being anticipated by

Smith et al (US 5,403,479).</u>

Claim 5: Smith teaches the preamble part of the claim given in the first

paragraph, i.e., one or membranes forming one or more modules with the permeate

side in communication with one or more headers, the membranes being normally

immersed, and is used for producing filtered permeate – see figures 2 and 7 column 2

lines 63-66. Smith teaches the cleaning events recited in the claim as follows:

(a) stopping permeation: column 17 lines 25-31 teaches that the feed flow is

shutoff, but the reference does not specifically state stopping permeate. However, this

is implied, since it is not possible to pass cleaning solution from the lumen side of the

membrane to the outside in the reverse flow without stopping permeation. "[I]n

considering the disclosure of a reference, it is proper to take into account not only

specific teachings of the reference but also the inferences which one skilled in the art

would reasonably be expected to draw therefrom." In re Preda, 401 F.2d 825, 826,

159 USPQ 342, 344 (CCPA 1968); In re Lamberti, 545 F.2d 747, 750, 192 USPQ 278,

280 (CCPA 1976).

(b) flow in chemical cleaners to one or more of the headers in a series of pulses,

pulses being separated by waiting periods in which flow of the chemical cleaner is

stopped: column 11 lines 29-47 teaches cyclically varying pressures in pulses to no

more than bubble point (range of 0.1 to 1 psi for loose MF membrane and up to 100 psi

for tight UF membrane). The cyclic varying of the pulses also implies stopping flow in

between pulses. In re Preda.

(c) resuming permeation: see column 11 lines 54-55, continued withdrawal of

permeate after cleaning cycles.

(d) Membrane remains immersed during the chemical cleaner flows: without

draining the tank would mean the membrane remains immersed – see column 11 lines

24-26.

(e) outside of the membrane is in fluid communication with water containing

solids – see the feed described as dirty water in the abstract, and containing organic

matter.

(f) during step (b), all chemical cleaner reaching the one or more headers

remains in the enclosed space or flows through the walls of the membrane in a direction

reverse to the permeate flow – see column 17 lines 50-56 when dead-end operation is

desired. Whether dead-end operation or recycle operation, the chemical cleaner

remains in the header and flows into the feed side in reverse flow.

Claim 6 adds the frequency of the cleaning events as 1-7 times per week and

also adds a more intensive cleaning 15 days apart. See figure 4 of the reference, which

shows cleaning data points 1 and 6 which are about 15 days apart (intensive cleaning),

and several event cleaning between them.

Claims 7-10: the weekly CT values fall in the range 2000 and 20,000 min.mg/L

for the cleaning events. The min/mg/L value for figure 4, for example, would be about

4500 for the event cleaning between the data points 1 and 6 (1 and 6 being intensive

cleaning are not counted). If one were to use the pulse cleaning step for one hour

duration, or have the hypochlorite in every one of the event cleaning in figure 4, this

would be about 10,000 or more. Also, this parameter is a result-effective variable

depending on the flow rate of the feed through the system, and the quality of feed, and

can be optimized. If the feed contains more bacteria and other organic matter, it will

require more chemical cleaner. Discovery of an optimum value of a result effective

variable in a known process is ordinarily within the skill of the art. In re Boesch and

Slaney, 205 USPQ 215 (CCPA 1980); In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA

1977); "[W]here the general conditions of a claim are disclosed in the prior art, it is not

inventive to discover the optimum or workable ranges by routine experimentation." In re

Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)

Claim 13: pulses selected to provide chemical cleaner in an area in the

membranes and in an area in tank water adjacent the outside of the membrane: see

Smith abstract re the fouling film formed on the outside surface of the membrane, and

col 14 lines 33-68 re effect of the cleaning solution on the fouling biofilm.

Claim 14: the pulsing pressure is in the range as in claim 14, since Smith uses

min 100 kPa *absolute* pressure (Smith says this as 1 bar or at least 0.1psig, which

means the 100kPa is absolute pressure. (100 kPa is 14.5 psi by conversion)). Since 5

– 55 kPa is above the pressure on the outside of the membrane (which at least would

be one atm, or about 1 bar), the pressures are within the same range. Membranes are

hollow fibers – see abstract.

Claim 15: the flow rate of the membrane should be inherently the same in Smith,

since Smith uses similar membranes (UF or microfiltration – see abstract). Under the

principles of inherency, if a prior art device, in its normal and usual operation, would

necessarily perform the method claimed, then the method claimed will be considered to

be anticipated by the prior art device. When the prior art device is the same as a device

described in the specification for carrying out the claimed method, it can be assumed

the device will inherently perform the claimed process. In re King, 801 F.2d 1324, 231

USPQ 136 (Fed. Cir. 1986)

Claims 16 and 17: The reference teaches that the amount of cleaning fluid discharged into the feed is very small to affect the permeate quality, and therefore, it may not be necessary to drain the tank after the cleaning step. Column 11 lines 50-56. This would imply that one could drain the tank to remove the cleaning chemicals if the amount of cleaning chemicals used is excessive, and/or otherwise advocates such draining. In re Preda. A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also Celeritas Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998). Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments (In re Susi, 440 F.2d 442, 169 USPQ 423 (CCPA 1971)). "A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same use. In re Gurley, 27 F.3d 551, 554, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994). Also, a reference is no less anticipatory if, after disclosing the invention, the reference then disparages it. The question whether a reference "teaches away" from the invention is inapplicable to an anticipation analysis. *Celeritas Technologies Ltd. v. Rockwell International Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998).

Claim Rejections - 35 USC § 103

2. <u>Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over</u>

<u>Smith'479.</u>

Claims 11-12: Claims 11 and 12 recite the time durations of the pulse and wait

periods, which specific ranges are not taught by the reference. However, the time

duration of the pulse and wait are, again, result effective variable, and would depend on

the degree of fouling expected from the bio-loading of the water and the flow rates

through the membrane. One of ordinary skill in the art could easily optimize these

variables. (In re Boesch..)

(10) Response to Argument

This application is one among a series of applications filed over the last six

years, as can be seen in the continuity data in the application records. The subject

matter covered in these series of applications is about processing wastewater streams

in large tanks using submerged membranes, and, particularly, the cleaning of the

membranes as they become fouled by the wastewater. Two of these applications are

pending on appeal along with this application, which are 10/461,687 and 09/916,247.

Claim 5 is the only independent claim in this application. All the limitations of

claim 5 are explicitly taught or implied by the reference as stated in the rejection.

Appellant contends two issues of the rejection: (1) that the Smith reference does

not teach stopping flow between pulses, and (2) that the Smith reference does not teach

dead-ending the chemicals flow while pulsing.

With respect to stopping the flow of cleaning chemicals during pulsing, the reference teaches applying selected low pressure above atmospheric, but no more than the bubble point of the membrane, to the cleaning chemical in the lumen of the membrane either continuously, or *cyclically*. *Thus, this low pressure, which is above the atmospheric pressure, but not more than the bubble point, is the cyclic peak pressure.* [Note: bubble point is defined as the pressure at which gas bubbles can break through the membrane; and is a used to determine membrane pore size: see the reference, "Lenntech Bubble Point", for the definition] Appellant argues that the reference further provides the minimum and maximum range of the low-pressure part of the cycle, but does not show where that data is given in the reference. The range taught in the reference in the cited paragraph is the pulse pressure as a minimum of 100kPa (Conversion: 100kPa = 14.5 psi) for a "loose MF membrane" and 100 psig (conversion: 100 psig = 690 kPa(g)) for "a tight UF membrane", with the pulsed maximum pressure generally not higher than 300 kPa (= 43.5 psi). All these pressures taught are the peak pressures of the pulse, not the low pressure in the cyclic variation, with the 100kPa being a minimum pulse peak pressure needed for an open membrane, 100 psig being a maximum pulse peak expected of a tight membrane, and 300 being a generic maximum pulse peak normally expected. Stated differently, for the "loose MF membrane" (5 μm pore size), the pulses are at 100 kPa pressure, with low pressure not stated, which can be zero, or no flow. For the "tight UF membrane" (pore size 50 Angstroms), the pulse pressure could be 100 psig (or about 700 kPa-g), with the low pressure of the cycle not stated, and again, could be zero. The reference requires that

the flow of the cleaning chemical is the bare minimum as seen in column 11, lines 45-

60. If the low pressure was 100 kPa in the pulse cycles as the appellant argues, the MF

membrane would be gushing the cleaning chemicals out. Thus the reference does

imply "no flow" between the pulses as a possibility. Please note that when the pressure

is below the bubble point, there can be no flow through the membrane, even if the pump

is on, especially when the cleaning chemical is a gas. The Smith reference also

teaches a gaseous cleaning chemical (column 12 lines 19-25). The claim recites a

cleaning chemical, and is not specific to liquids or solutions.

With respect to the argument that the reference does not teach dead-ending the

cleaning chemical, appellant reasons that the dead-ending referred to in column 17

lines 50-56 of the reference is not applicable to pulsed flow, and is taught only in

relation to recirculation flow. This is not convincing because in column 11 line 38

teaches "When pulsed to achieve pulsed diffusion, the pressure exerted ...", which

means that "diffusion controlled flow" could also be pulsed, and that the dead-ending is

not limited non-pulsed flow. In addition, a dead-end flow of the chemical cleaner is not

expressly recited in the claim.

Claim 6: the appellant has not shown the criticality of the periodicity of the

"intensive cleaning" to make it patentable. The intensive cleaning steps of points 1 and

6 of figure 4 of the reference may be shorter than 15 days; but this would not make the

claim patentable; it would be only optimizing a result effective variable, since the

cleaning required is dependent on the degree of fouling based on the nature and the

process flow of the contaminated water. The Smith reference clearly teaches the

general objects of the invention in column 12 lines 26-55.

Claims 7-10: the argument presented in the rejection of these claims is not

persuasive; the claims are not patentable over the reference as stated in the rejection.

There is no reason why the data point 5 cannot be a cleaning event performed between

1 and 7 times per week. The claim does not recite that all the cleaning events are

exactly identical; it only recites "cleaning events".

Claim 13 does not recite any specific pulse length or wait period; it only states

that the variables are selected to have the cleaning chemical in an area in the

membrane and the surrounding water. Column 14 lines 33-40 specifically teaches that

the cleaning chemical has the maximum effect in the pores and the fouling film (which is

outside the lumen of the hollow fibers in the reference).

Claim 14: appellant's argument is not addressing the issue; the dead-ending part

of claim 5 is addressed above.

Claim 15: the flow through the membrane is inherently the same because Smith

uses the same or similar membrane as explained in the rejection. Smith reference also

belongs to the same assignee as the present application. More over, the argument that

the membrane flow would depend on the internal diameter and length of the membrane

is not very convincing, when the flow recited is L/*square meter*/hr. The flow range has

a six-fold spread (8.5 – 51) to be of any particular specificity with applied pressure.

Appellant needs to explain how the second header would influence or change the

Smith's flow rate through the membrane; membrane flow rate would only depend on the

trans-membrane pressure difference.

Claim 16 and 17: draining of the chemical cleaner is taught as unnecessary by

Smith in column 11 lines 50-60.

Rejection under 103 of claims 11 and 12: appellant has no convincing argument

that why they should not be result-effective variable. Pulse period of an order of

magnitude greater does not make it "teaching away".

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the

Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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LENNTECH

Bubble point

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Definition and principle

The bubble point method is the most widely used for pore size determination. It is based on the fac
fluid and pore size with a constant wetting, the pressure required to force an air bubble through the
proportion to the size of the hole.
The theory of capillarity states that the height of a water column in a capillary is indirectly proportic
diameter.
Surface tension forces held up the water in the capillary and as its diameter gets smaller, the weigh
column get higher. Water can be pushed back down in a pressure wich has the same equivalent hei
water column. Thus by determining pressure necessary to force water out of the capillary, the diam
can be calculated.
In practice, the pore size of the filter element can be established by wetting the element with the fl
the pressure at which the first stream of bubbles is emitted from the upper surface of the element.

Procedure

The procedure for bubble-point test is described in American Society for Testing and Materials Stan
Method F316.
The top of the filter is placed in contact with the liquid, the bottom with air, the filter holder is conn
of a regulated pressure. The air pressure is gradually increased and the formation of bubbles on the
noted. At pressures below the bubble point, gas passes across the filter only by diffusion, but when
high enough to dislodge liquid from the pores, bulk flow begins and bubbles will be seen.
The initial bubble test pressure determines the size (and location) of the largest hole, the open bub
determines the mean pore size of the element. The latter can be affected by flow velocity as well as
The theoretical relation between this transition pressure and the bubble-point pressure is:

$$D = (4\gamma \times \cos \theta) / P$$

where:
    P = bubble-point pressure
    γ = surface tension of the liquid (72 dynes/cm for water)
    θ = liquid-solid contact angle (which for water is generally assumed to be zero)
   D = diameter of the pore

Since no pores in a practical filter element are likely to be shaped like capillary tubes it is necessary
shape correction factor K into the formula.
Since γ and θ are constant, the formula can be simplified by introducing an empirical factor K_1 depe
material and form of the units employees:

$$D = K_1 / P$$

D is again the maximum average diameter of the pores in μm.
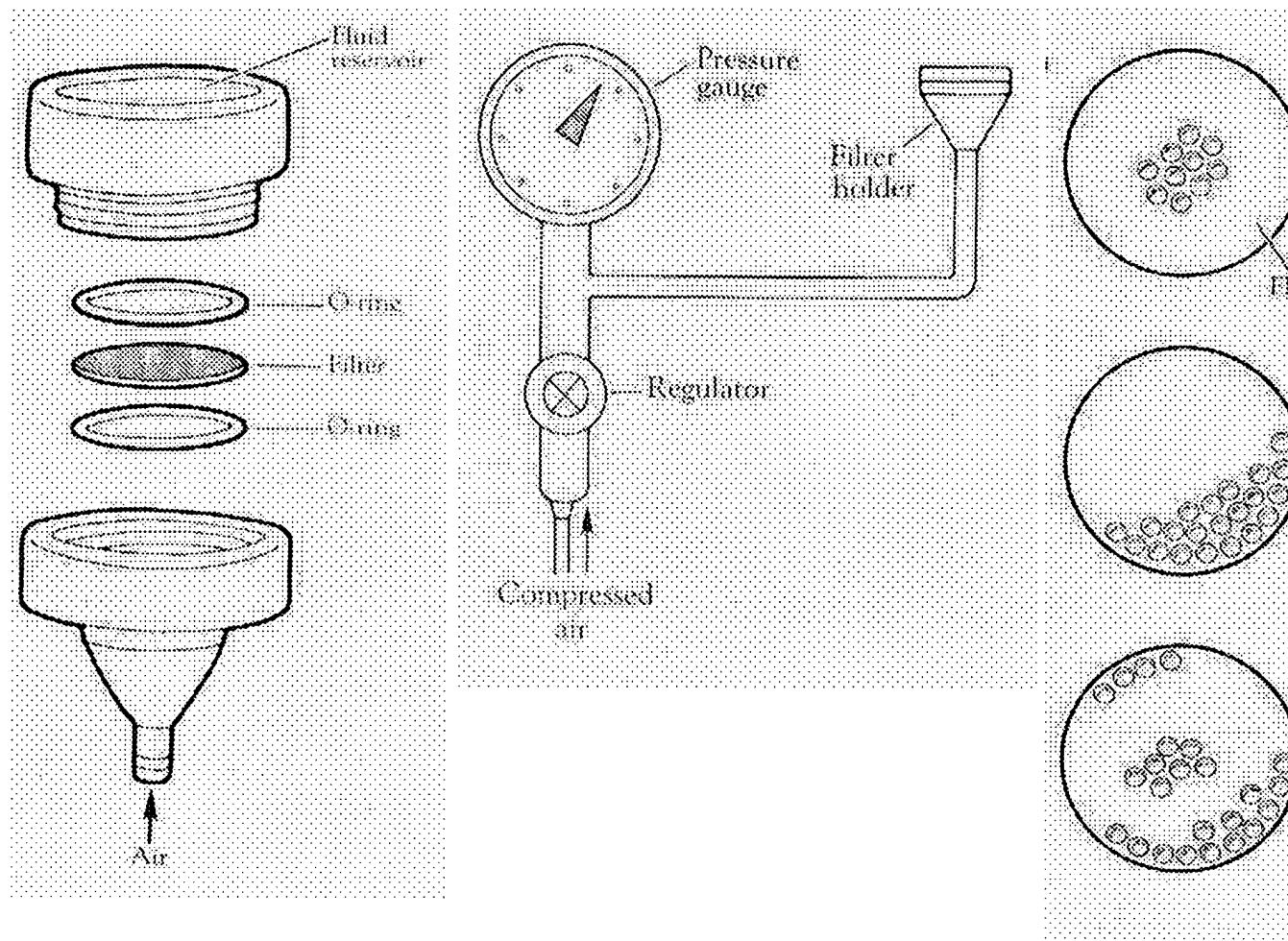
Arrangement of filter and filter holder

Connection of filter holder to a pressure regulated system

Appearance

Advantages

One of the great advantages of the bubble point test is that it can be prformed of filters under catu: and with any filter. It si a non-destructive test, thus it does not contaminate the filter and so can be determine the integrity of a filter at any time, as well as establishing the absolute rating.
In the future, with further advantages in computer software and control, it may be possible to use t rate or pressure increases to more accurately determine what happens in a sample before the bubb reached, such as diffusion.

Related topics

Beta ratio

Absolute Vs. nominal rating for filters

Sediment filters

Oil filtration and Oil-Block filters

Sources: '*Filters and Filtration Handbook*', T Christopher Dickenson, Elsevier, January 1, 1997

'*Membrane filtration*', Thomas D. Brock, Science Tech, Inc. Madison

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